Sept. 4, 1928. 1,683,546

J. D. HASKELL

BEATING ENGINE

Filed May 18, 1926 4 Sheets-Sheet 1

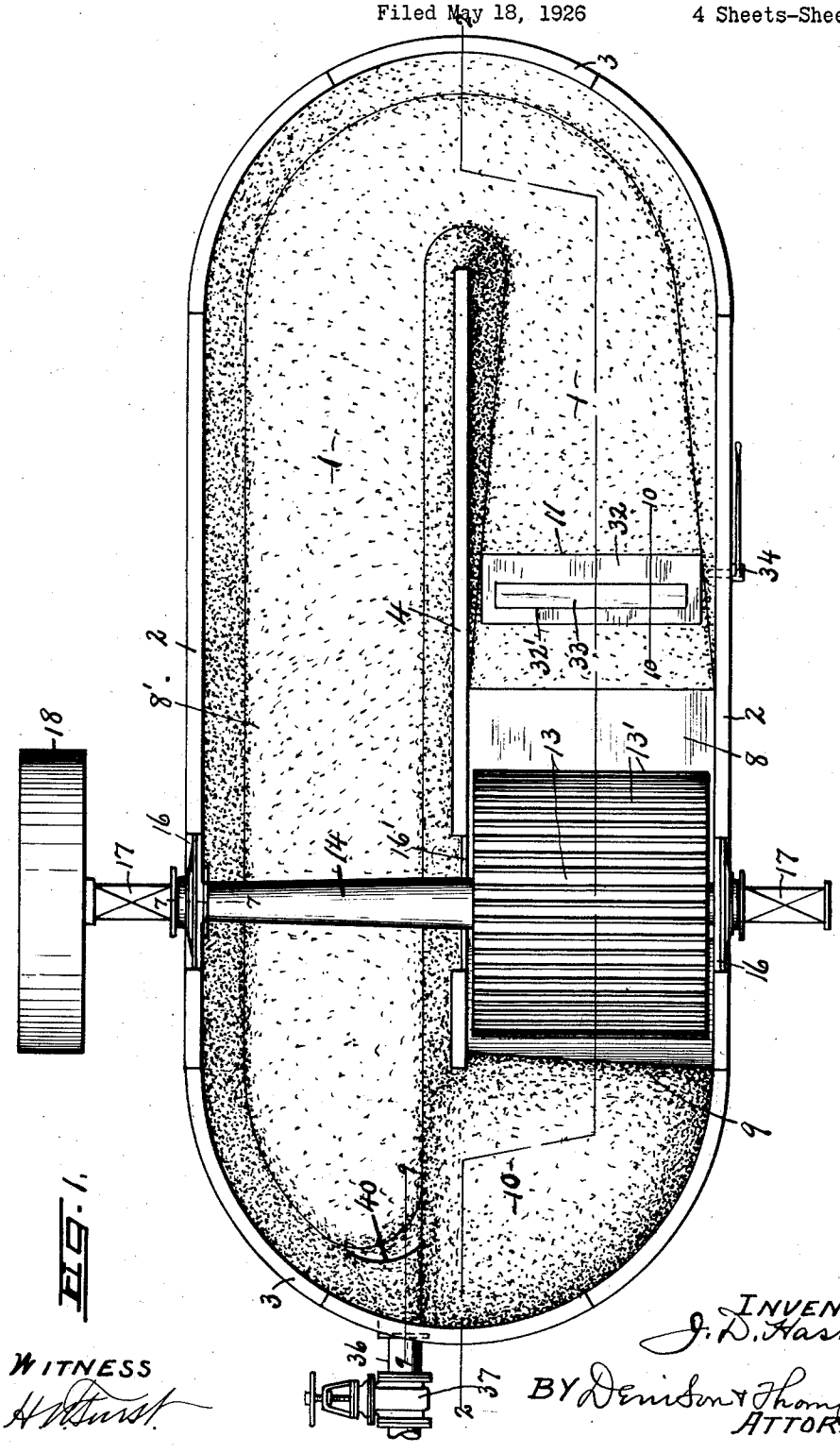

FIG. 1.

WITNESS
H. Hurst

INVENTOR
J. D. Haskell

BY Denison & Thompson
ATTORNEYS

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J. D. HASKELL

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Filed May 18, 1926 4 Sheets-Sheet 2

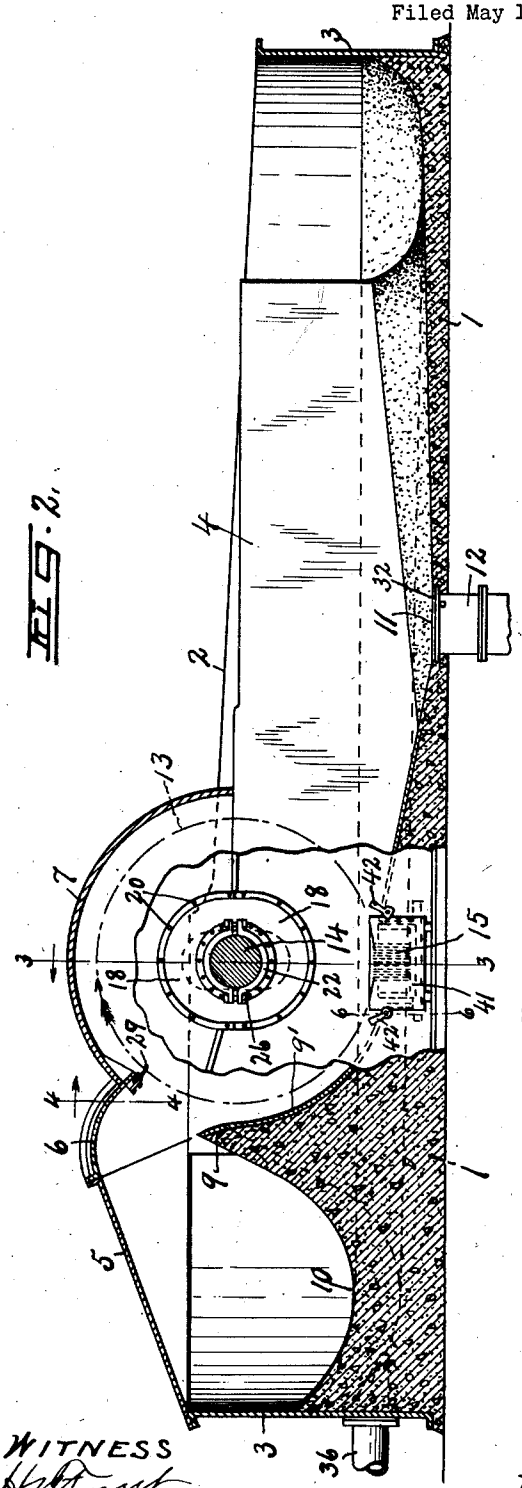

FIG. 2.

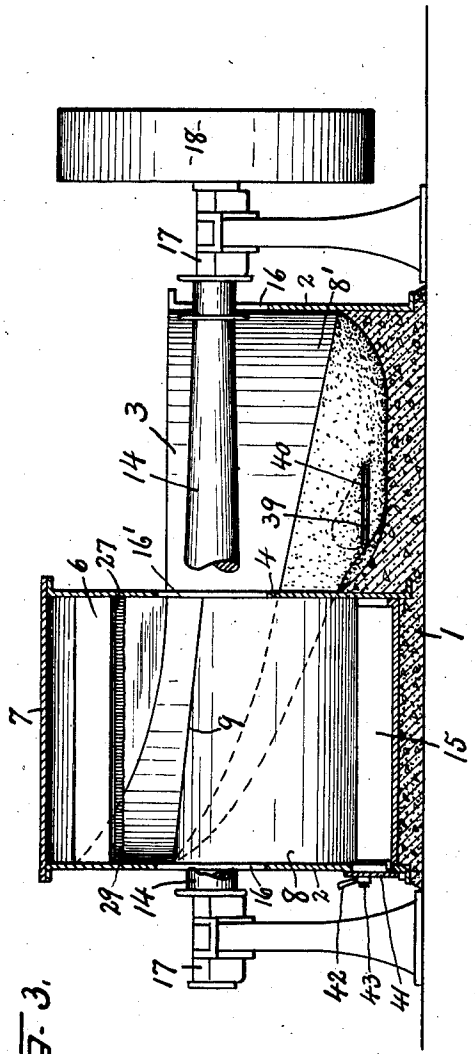

FIG. 3.

WITNESS
H. W. Hurst.

INVENTOR
J. D. Haskell
BY Denison & Thompson
ATTORNEYS

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J. D. HASKELL

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Fig. 4.

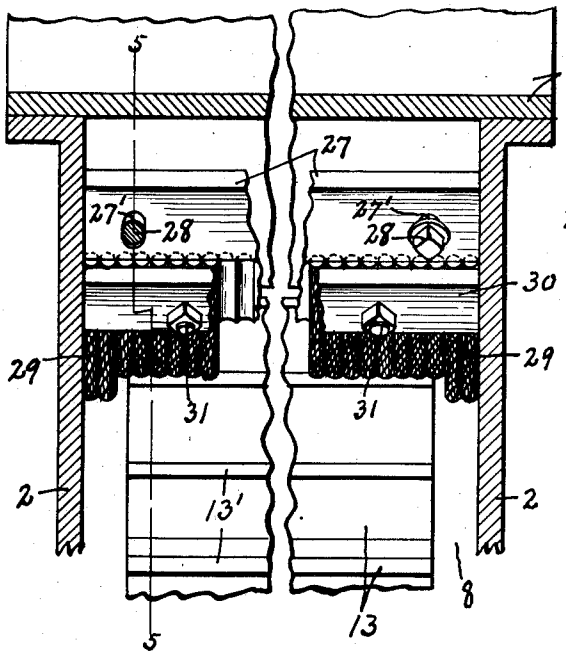


Fig. 5.

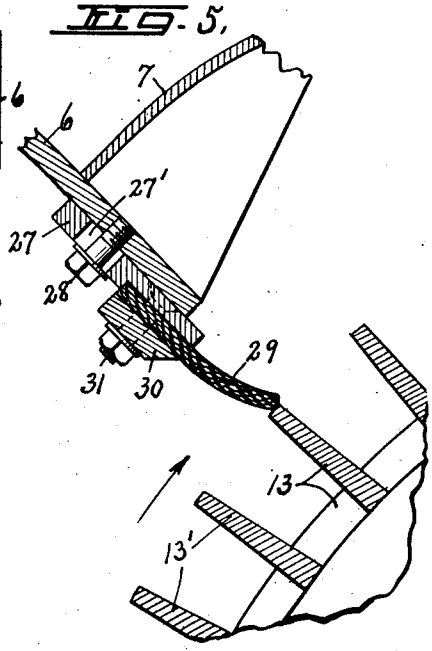
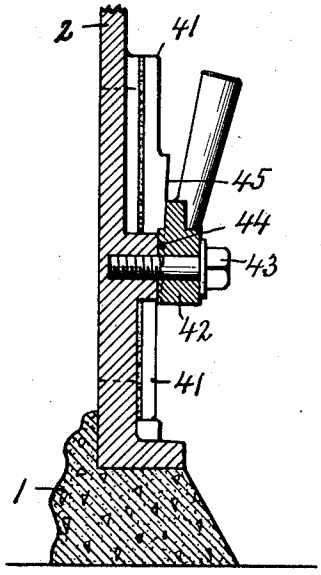


Fig. 6



Witness
H. Hurst

INVENTOR
J. D. Haskell

BY Denison & Thompson
ATTORNEYS

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J. D. HASKELL

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Fig. 7.

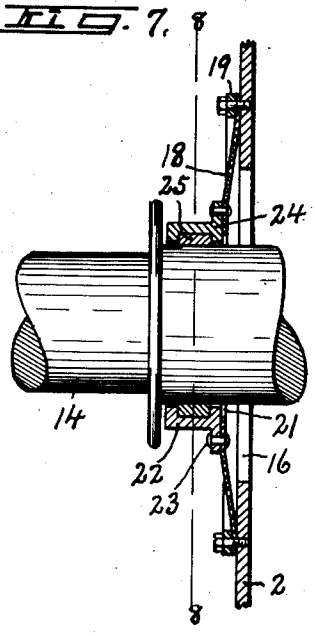


Fig. 8.

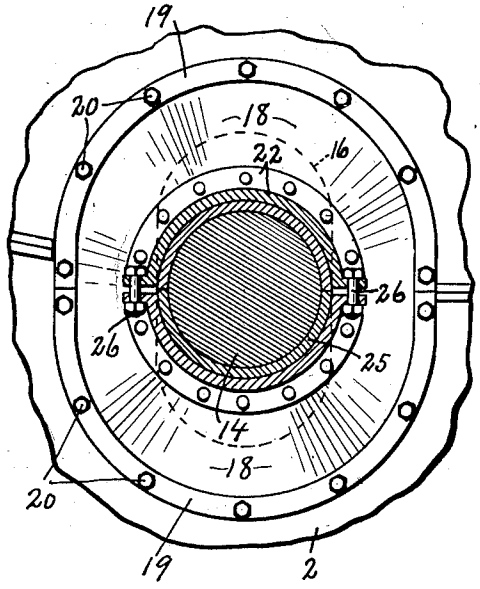


Fig. 9.

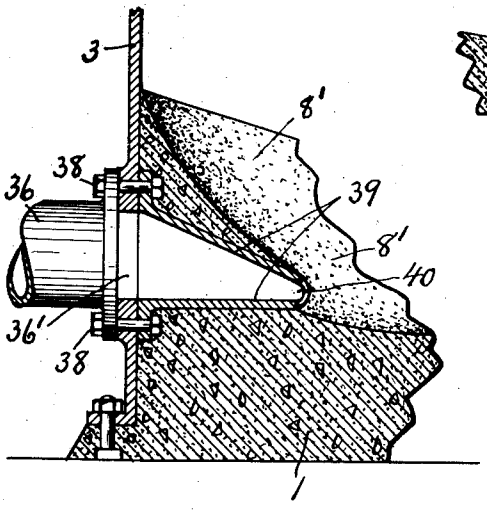
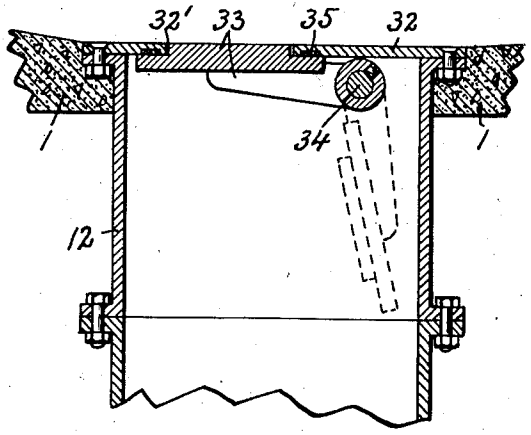


Fig. 10.



INVENTOR
J. D. Haskell
BY Dennison & Thompson
ATTORNEYS

WITNESS
H. Wurst.

Patented Sept. 4, 1928. 1,683,546

UNITED STATES PATENT OFFICE.

JOHN D. HASKELL, OF FULTON, NEW YORK, ASSIGNOR TO DILTS MACHINE WORKS INCORPORATED, OF FULTON, NEW YORK, A CORPORATION OF NEW YORK.

BEATING ENGINE.

Application filed May 18, 1926. Serial No. 109,898.

The invention relates to a beating engine for reducing paper stock to the required consistency for manufacture into paper and involves the use of a vat or tub in which the stock is ground, comminuted or reduced to a finely divided state and circulated through connected channels in the vat by means of a rotary beater roll having peripheral vanes or fly bars movable in one of the channels of the vat in grinding co-action with an underlying relatively stationary abrasive bed or cutter blades.

The beater roll is located near the outwardly rounded rear end of the tub which together with the backfall, rear end of the back channel, doctor and cover plate are constructed in such manner that the paper stock (and particularly the thinner stock) carried over the backfall by the beater roll will be thrown by centrifugal force directly into the back channel for return therethru to the front side of the beater roll channel aided by the suction produced at the front side of the beater roll thereby accelerating the flow of the stock away from the beater roll thru the back channel and return to the front side of the beater roll, all of which greatly reduced the load upon and power required for operating the beater roll and affords a freer and more expeditious circulation of the stock than has heretofore been practised.

The supporting shaft for the beater roll usually extends through openings in opposite sides of the tube and is journaled in vertically movable bearings to allow for a limited vibratory or jumping movement of the beater roll incidental to its action upon materials of widely varying resistances to cutting or grinding and one of the objects of this invention is to provide a more flexible, permanent and efficient packing-box means for sealing the shaft openings in the sides of the tub against leakage of liquid stock or water therethru than has heretofore been practised.

Another object is to provide a flexible "doctor" which will automatically maintain scraping contact with the edges of the fly bars under the vibratory or jumping movements of the beater roll and thereby assure a more continuous deflection and circulation of the main body of the stock over the backfall than has heretofore been practised.

A further object is to provide a more convenient and expeditious means for clamping and releasing the cover plate or door for the bed plate chamber and at the same time to assure a liquid tight joint between the door and end walls of the chamber when the door is clamped in its operative position.

Another object is to provide the lowest point of the bottom of the tub with a quick opening dump valve which is adapted to swing downwardly from its closed position in the direction of discharge of the stock so as to leave a free and unobstructed passage for the stock along the bottom of the vat to the discharge opening.

Another object is to provide a wash-out device constructed and located in such manner as to effect a more complete and thorough flushing of the inner walls of the vat than has heretofore been practised.

Other objects and uses relating to specific parts of the apparatus will be brought out in the following description.

In the drawings:—

Figure 1 is a top plan of a beater engine embodying the various features of the invention.

Figure 2 is a longitudinal vertical sectional view taken on line 2—2, Figure 1.

Figure 3 is a transverse vertical sectional view taken in the plane of line 3—3, Figure 2.

Figure 4 is an enlarged vertical sectional view, partly broken away, through the upper portion of the vat showing a portion of the beater roll and portions of the "doctor" or flexible scraper for removing the stock from the fly bars of the beater roll.

Figure 5 is a detail sectional view taken in the plane of line 5—5, Figure 4.

Figure 6 is an enlarged detail sectional view of the outer side of the vat at the end of the bed plate showing one of the clamping means for holding the cover plate in its closed position.

Figure 7 is an enlarged longitudinal sectional view taken on line 7—7, Figure 1, showing the means for sealing the shaft opening for the beater roll in one side of the vat.

Figure 8 is a transverse sectional view taken in the plane of line 8—8, Figure 7.

Figure 9 is an enlarged sectional view taken on line 9—9, Figure 1, showing the discharge nozzle for the wash-out device and its relation to the back-channel of the vat.

Figure 10 is an enlarged view taken on line 10—10, Figure 1, showing the valve for controlling the discharge of the contents of the vat.

As illustrated, this vat or tub comprises an elongated casing having a concrete bottom —1—, upright substantially straight side walls —2— and outwardly curved substantially semi-cylindrical end walls —3— together with a mid-feather —4— and hood sections —5—, —6— and —7—, the ends of the mid-feather being spaced some distance from the corresponding end walls —3— to form connecting passages between the adjacent ends of the unflow and return channels as —8— and —8′—.

The tub is provided with a suitable backfall extending upwardly from the bottom thereof to any desired height, preferably somewhat above the center of the beater roll and adjacent the rear end of the mid-feather, the bottom of the tub between the backfall and the outwardly rounded rear end of the tub being preferably concaved longitudinally to form a bowl —10— into which the stock is precipitated after passing over the backfall.

The bottom of the bowl —10— is also inclined laterally and downwardly from the outer side wall of the beater channel —8— to the channel —8′— which latter is inclined longitudinally from end to end of the vat, and return into the channel —8— to a point as —11— at the front of the beater roll, said point —11— being the lowest level of the bottom of the circulating channels so that the stock passing over the backfall will flow more or less rapidly from the bowl —10— laterally and downwardly along the channel —8′— returning into the front end of the channel —8— to the lowest point —11— where it may be discharged when desired thru an outlet conduit —12— in a manner hereinafter more fully described.

It is evident, however, that this circulation of the stock through the channels of the tub may be continued indefinitely or until the stock is reduced to the required consistency.

A beater —13— having a suitable fly bars —13′— is mounted upon a supporting shaft —14— within the channel —8— adjacent the front face of the backfall —9— to cooperate with an underlying bed plate —15— in the bottom of the vat for reducing the paper stock to the required consistency and for circulating said stock through the channels of the vat.

The shaft —14— extends through openings —16— in opposite sides of the vat and also through an opening —16′— in the mid-feather —4— and is preferably journaled in external bearings —17— and provided at one end with a pulley —18— which may be connected to any available source of power for transmitting rotary motion to the shaft and beater roll.

Any movable means, not shown, may be employed for supporting the bearings —17— and incidentally the shaft —14— and beater roll —13— to permit such vertical vibratory movement of the beater roll and support therefor as may be caused by the action of the beater roll upon materials of widely varying resistances to disintegration and for adjustment of height of beater roll and it, therefore, becomes necessary to provide some means for reducing to a minimum the liability of leakage of the water through the shaft openings —16— in the side of the vat.

Packing box for beater shaft.

For this latter purpose is provided special forms of packing boxes consisting in this instance of flexible diaphragms —18— of rubber or equivalent resilient material, one for each opening and inasmuch as both packing boxes are alike the description of the construction of one will serve for both.

Each diaphragm is of sufficient area to cover and extend some distance beyond the walls of its opening —16— and has its marginal edge secured by clamping rings —19— and bolts —20— to the inner face of the adjacent side of the vat as shown more clearly in Figures 7 and 8, said diaphragm being provided with a central opening —21— for receiving the shaft —14— of the beater roll.

A sectional gland box —22— has its marginal edge secured by rivets —23— or equivalent fastening means to the diaphragm —18— around the central opening —21— to extend around the adjacent portion of the shaft —14— and is provided with an annular groove —24— for receiving a packing ring —25— and holding said packing ring in close contact with the periphery of the shaft to form a water tight joint therewith and still permit the free rotation of the shaft therein and together with the diaphragm —18— effectively seals the opening —16— against leakage of water therethrough from the interior of the vat while the flexibility of the diaphragm permits limited vibratory movement of the shaft and beater roll thereon.

The gland rings —22— and —25— are preferably made in two parts to permit them to be more easily placed upon or removed from the shaft and are secured together by clamping bolts —26—, Fig. 8.

Flexible doctor for beater roll.

Owing to the vertical vibration or jumping movement of the beater roll, and the necessity of vertical adjustment during its coaction with the bed plate upon widely varying conditions of the stock considerable difficulty has been experienced in removing the

stock from the fly bars as it is carried upwardly against the front face of the backfall and in order to overcome this difficulty a "doctor" plate —27— is adjustably secured by bolts —28— to the front edges of the hood section —6— for receiving and supporting a flexible scraper —29— of steel cable or equivalent material which is secured thereto by a clamping bar —30— and bolts —31— so that its free edge may project into the path of movement of the outer edges of the fly bars —13'— in all positions of vibration or vertical movement of the beater roll, the plate —27— being slotted at —27'— to permit the entire "doctor" to be adjusted toward the periphery of the beater roll to compensate for wear of the flexible member —29—, and is also corrugated to receive the cable —29—.

This construction of "doctor" assures the maintenance of its brushing contact with the outer edges of the fly bars under the vibratory movements of the beater roll and also assures a more thorough cleansing of the stock from the fly bars and the deflection thereof over the backfall thereby assisting in the uniform and continuous circulation of the stock.

Dump valve.

The upper end of the discharge conduit —12— is embedded in the concrete bottom —1— at its lowest point —11— and is provided with a top plate —32— forming a continuation of the bottom of this portion of the vat and provided with a discharge opening —32'— which is controlled by a valve —33—.

This valve is hinged at —34— to the underside of the plate —32— at one side of the opening —32'— to swing downwardly and laterally from its closed position shown by full lines to its open position shown by dotted lines, Figure 10, a portion of said valve being adapted to enter the opening —32'— when closed while its underlying portion is somewhat larger and is adapted to engage a packing ring —35— to make a liquid tight joint therewith.

It will be observed that the valve —33— when opened swings in the direction of discharge of the stock entirely clear of the opening —32'— thereby affording a free and unobstructed passage of the stock from the interior of the vat through the opening —32'— and into the discharge pipe —12—.

Wash-out device.

It will be noted that the bottom of the channels through which the stock is circulated is concaved in cross section by banking the marginal edges thereof against the outer side walls of the vat and also against the opposite sides of the mid-feather —4— to assure a freer flow of the stock through said channel and also to facilitate the thorough flushing of the interior of the tank and complete discharge of the stock from the lowest point of the bottom when desired.

The means for flushing the tank consists of a water supply pipe —36— adapted to be connected to any available source of water supply under pressure and provided with a valve —37— for controlling said supply.

One end of the supply pipe —36— is provided with an annular flange secured by bolts —38— to the outer face of the rear end wall —3— of the vat in alignment with the adjacent end of the channel —8'— near its junction with the bowl —10— to communicate with an inlet nozzle —39— which is imbedded in the adjacent end of the concrete bottom of the vat and secured to the inner face of the end wall thereof by the same bolts —38—, it being understood that the adjacent end wall —3— is provided with an opening —36'— connecting the pipe —36— to the outer end of the nozzle.

The nozzle extends inwardly from the end wall —3— entirely through the adjacent concrete portion of the bottom to the adjacent end of the channel —8'— and while its outer end may be circular to correspond to the cylindrical form of the pipe —36— its inner end is preferably flattened and flared laterally and provided with a laterally elongated opening —40— just above the bottom of the channel so that when the water for flushing purposes is turned on it will be discharged into the interior of the channel in the form of a fan-shaped stream spreading out to the sides as well as along the bottom of said channel to effect a thorough cleansing of all portions of the interior of the tub from the inlet to the outlet.

Clamping device for bed plate cover door.

The bed plate —15— is usually provided with a series of steel bars mounted side by side edgewise vertically within a suitable supporting box in the concrete bottom of the vat directly under the beater roll —13— to cooperate therewith in reducing the paper stock to the required consistency, the outer side wall of the vat being provided with an opening through which the bars may be removed or replaced when desired.

This opening is provided with a suitable cover plate —41—, Figure 6, adapted to be clamped against the outer faces of the walls of the opening to form a liquid tight joint therewith.

This cover plate—41— is firmly held in its closed position by a pair of cam levers —42— which are journaled upon pivotal studs —43— on the adjacent side wall of the vat at opposite ends of the cover plate and are provided with cam faces —44— movable toward and out of engagement with adjacent cam faces —45— on the cover plate so that

when turned to one position the cover plate will be tightened and when turned to another position the cover plate will be released for removal by hand when desired thereby affording an expeditious means for clamping and releasing the cover in and from its operative position.

What I claim is:—

1. A closure for shaft openings in paper stock containers, comprising a flexible diaphragm having a gland for receiving the shaft.

2. A closure for shaft openings in paper stock containers, comprising a resilient diaphragm having a gland for receiving a shaft.

3. A closure for shaft openings in liquid containers, comprising a flexible diaphragm having its marginal edge adapted to be secured to the walls of the opening and its central portion provided with a gland for receiving the shaft.

4. A closure for shaft openings in liquid containers, comprising a flexible diaphragm having its marginal edge adapted to be secured to the walls of the opening and its central portion provided with a gland for receiving the shaft, said gland including a collar having an internal annular groove and an annular packing ring in the groove.

5. A closure for shaft openings in liquid containers comprising a resilient diaphragm having its marginal edge adapted to be secured to the walls of the opening and its intermediate portion provided with a shaft opening and a gland secured to the diaphragm around its opening for receiving the shaft.

6. In a beater engine, a vat having shaft openings in opposite sides, a beater roll having a shaft extending through said openings, flexible diaphragms having their marginal edges secured to the walls of said openings and provided with glands for receiving the shaft.

7. In a beating engine having a beater roll, a doctor having a flexible wiper adapted to cooperate with the periphery of the roll for removing stock therefrom.

8. In a beating engine having a beater roll, a doctor having a flexible wiper adapted to cooperate with the periphery of the roll for removing stock therefrom, and means for supporting the doctor adjustably to compensate for wear of the wiper and roll.

9. In a beating engine having a beater roll provided with peripheral fly bars, a doctor having a flexible wiper positioned to project into the path of movement of the fly bars.

10. In a beating engine having a beater roll provided with peripheral fly bars, a doctor having a flexible wiper positioned to project into the path of movement of the fly bars, and adjustable edgewise to compensate for wear of the wiper.

11. A doctor for beater rolls comprising a flexible wiper and a clamping device therefor.

12. A doctor for beater rolls comprising a flexible wiper, and clamping members for holding the wiper, one of said clamping members having a corrugated face for engaging the portion of the wiper between said members.

13. A doctor for beater rolls comprising a wiper composed of flexible steel cables and holding means for the wiper.

14. A doctor for beater rolls comprising a wiper composed of flexible steel cables and holding means for the wiper, said holding means with the wiper thereon being adjustable to compensate for wear of the wiper.

15. A doctor for beater rolls comprising a wiper composed of flexible steel cables and a holder therefor comprising clamping members one of which is provided with corrugations for receiving the cables.

16. In a beating engine, the combination with a tub having a mid-feather and front and back channels connected around the ends of the mid-feather by return channels, of a back fall extending from the rear end of the mid-feather across the front channel and having its rear face sloped downwardly, rearwardly and laterally to the bottom of the back channel and forming with the adjacent end of the tub a continuous and unobstructed sweep-way for the water and stock from the upper edge of the back fall to the back channel, the top edge of the backfall being inclined downwardly from the outer wall of the front channel to the midfeather, and a beater roll in the front channel adjacent the back fall.

17. In a beating engine, the combination with a tub having semi-circular ends and a mid-feather forming front and back channels connected around the ends of the midfeather by semi-circular channels, of a backfall extending from one end of the midfeather across the front channel at the beginning of curvature of the adjacent semi-circular end wall and forming with said end wall an unobstructed passage for the water and stock from the back-fall to the back channel, the bottom wall of the back channel being inclined downwardly from its junction with the backfall to its junction with the front channel, the front channel being inclined downwardly from its junction with the back channel some distance beyond the corresponding end of the mid-feather and toward the backfall, and a beater roll adjacent the back-fall.

18. A beating engine comprising a tub having a mid-feather and front and back channels connected around the ends of the mid-feather, a back-fall extending from the rear end of the mid-feather across the front channel and forming with the adjacent end wall an unobstructed sweep-way sloping

gradually from the top edge of the back-fall to the adjacent end of the back channel, and a beater roll in the front channel adjacent the back-fall.

19. A beating engine comprising a tub having return ends and a mid-feather forming front and back channels connected around the ends of the mid-feather by return channels, a back-fall extending across the rear end of the front channel and forming with the adjacent end wall of the tub the adjacent return channel, a beater roll adjacent the back-fall, the bottom of the front channel between the beater roll and the other end of the mid-feather being at a lower level than the bottom of the remaining portions of the channels and provided with an outlet, and means for opening and closing the outlet.

20. In a beating engine, a tub having front and back channels, a back-fall across the rear end of the front channel having its rear face inclined downwardly and laterally from its upper edge to the adjacent end of the back channel and forming with the adjacent end wall of the tub a continuous and unobstructed spiral sweep-way connecting adjacent ends of said channels, and a wash-out nozzle in the end of the back-channel near its junction with the sweepway arranged to direct a cleansing fluid lengthwise of said back-channel and along the bottom thereof.

21. In a beating engine, a tub having return ends and a mid-feather forming front and back channels and return end channels, a back-fall across the rear end of the front channel, and a beater roll in the front channel adjacent the back fall, the rear face of the back-fall and bottom of said channels being continuously inclined downwardly from the top edge of the back-fall along the back channel and return to a position in the front channel between the beater roll and opposite end of the mid-feather, means for introducing water into the end of the back channel adjacent the back fall, and means in the bottom of the front channel at its lowest level for withdrawing material from the tub.

In witness whereof I have hereunto set my hand this 8th day of May, 1926.

JOHN D. HASKELL.